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ORIGINAL COMMUNICATIONS.

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*On the Prolonged Use of Bromide of Potassium,  
in Large Doses, and its Value in the Treatment  
of Epilepsy.*

BY J. N. DANFORTH, M.D., CHICAGO.

The past ten years have proved unusually prolific as regards new remedies; and of these no one has obtained a better reputation, or more rapidly grown in favor with the medical profession than the bromide of potassium.

The experiments of Locock, Brown-Sequard and Behrend, long ago established the value of this remedy in cases where obstinate wakefulness or "coma vigil" was the predominating morbid condition; and this without very much regard to the essential or underlying cause thereof. But a more extended and comprehensive experience has likewise proved that the bromide of potassium is an exceedingly valuable remedy in many of the chronic diseases which directly involve the great nervous centers. Prominent

among these may be mentioned epilepsy—both on account of its obscure pathology, and the sadly inefficient means for its treatment, heretofore at our command. Indeed, from the earliest dawn of medicine as an inductive science, up to the present period of active research and discovery, the unfortunate epileptic has been universally abandoned as hopelessly incurable.

Dr. Watson (*Practice of Physic*, page 425), after enumerating the formidable array of remedies which have been successively recommended, tried and condemned, says: "This long array of drugs, all of which have been known, or supposed, to accomplish a cure, affords, in truth, one of the strongest evidences of the intractability of the disease under any plan of treatment"—a remark, the truth of which, every physician of any considerable experience has too often felt himself obliged to assent to.

Latterly, however, the bromide of potassium has seemed to outrank all other remedies in the treatment of this fearful disease—having been brought prominently before the profession by the writings of Dr. J. Russell Reynolds, of University College, London, and of Drs. Bazire, Brown-Sequard, Rannkill, Radcliffe and Hughlings Jackson, of the British National Hospital for the Paralyzed and Epileptic. The experience of these eminent physicians seems to indicate pretty clearly that, in order to derive any real, or at least permanent benefit from this drug two conditions are always and absolutely essential: 1st. that the remedy be given in large doses; 2d. that its administration be persistently and uninterruptedly continued, for months, or even *years*, if a cure be not sooner accomplished. As this course contemplates the administration of a remedy of acknowledged and well-established potency in doses larger, and for a period of time longer than has been, or is now deemed altogether safe by the great majority of physicians, I propose to raise, and attempt, as far as I am able, to answer, these two queries: First, to what extent may the bromide

of potassium (or ammonium, for one of these salts may be looked upon, as, in its therapeutic relations, the type of the other) be given without endangering the safety of the patient? and, secondly, How long may these unusually large doses be continued, without producing injurious or alarming results?

First, as to the dose. An ordinary dose of the bromide is stated to be "from three to ten grains, three times a day;" but this quantity, as experience has abundantly and repeatedly proved, is utterly inefficient and useless in the treatment of epilepsy in the adult. On the other hand, the experience of many eminent and trustworthy observers, in different quarters of the globe, seems to have demonstrated, beyond dispute, that this remedy, given in much larger doses, as from fifteen to sixty grains twice or thrice daily, *does* exercise a marked control over the epileptic attacks, whatever may be said in regard to a permanent and unqualified cure.

It follows, then, that these somewhat startling doses *must* be given, or the patient *must* be abandoned to his fate, and epilepsy must continue to be, as it has been, the opprobrium of medicine. The terrible nature of this disease, and the almost inevitable mental ruin in which it terminates, demand of us the employment of every efficient measure at our command; nor should the ill success of the past, or prejudice, or merely theoretical notions as to its incurability, be allowed to stand in the way of the careful, faithful and prolonged trial of any and every remedy which seems to promise the least benefit to this most unfortunate class of patients.

In the present instance, the *real* truth seems to be, that the bromides have been repeatedly given in doses of from fifteen to forty, or even sixty, grains, not only without any perceptibly injurious effects, but with the happiest results, especially in the treatment of epilepsy; that this practice is daily gaining ground with those physicians whose opportu-

nities for acquiring experience in the treatment of epilepsy are such as to be of the greatest value, and command the fullest confidence; and that the practitioner has hardly the right to withhold this remedy, in cases where the epileptic attacks are sufficiently frequent to demand treatment at all.

Probably the National Hospital for the Paralyzed and Epileptic has, heretofore, afforded the widest and most fruitful field for observation in regard to the true merits of the bromides; and the testimony of the officers of this institution are very pointedly in their favor. Says Dr. P. Victor Bazire (Trousseau, Vol. I, p 99, note), "At the National Hospital for Paralysis and Epilepsy, bromide of potassium has been extensively used by Dr. Brown-Sequard, Dr. Ramakill, Dr. Radcliffe, Dr. Hughlings Jackson and myself."

\* \* \* These gentlemen speak of the remedy in terms of unqualified praise. They are in the habit of using it in doses of from fifteen to twenty or thirty grains twice or thrice daily—or in accordance with the demands of each individual case. The dose most commonly employed by them, however, is fifteen or twenty grains twice a day, given when the stomach is empty; and in this quantity, writes Dr. Bazire, "I have seen patients who had taken the bromide for two and three years" without any injurious effects whatever. But Dr. J. Russell Reynolds is, perhaps, the most earnest advocate of large doses. "Bromide of Potassium," writes he, "in small doses, has appeared to be of little or no service; but in large doses it has scarcely ever failed to give much relief;" (System of Medicine, Vol. 2, p 280,) and, again (op. cit. p 968), "the cure of epilepsy is effected by doses varying from five to forty grains, given three times daily;" and the latter dose, he adds, "does no harm, for it may be taken for many months and even for years, without producing derangement of any sort, or in any direction." M. Behrend relates a case in the *American Medical Times*, Vol. 6, p 45, in which he gave twenty-five grains three times a day for more than a week, with the

happiest effects, and adds that "it produces in these large doses neither disagreeable nor toxical effects." Dr. Samuel R. Percy, of New York, has given "eight drachms in seventy-two hours, without headache or other unpleasant symptoms."

It is not my design, however, to enter the lists as the champion of any system of dosing, large or small, or to present a one-sided and partisan view of a subject of such practical and growing importance; but rather to collate and briefly state the facts on both sides. While, therefore, it seems to be well established that the bromide may be safely and beneficially given in very large doses in the great majority of cases, it is also true that unpleasant and injurious effects have, occasionally, been met with. The symptoms indicative of an over-dose, or of "saturation" of the system, are those which are usually recognized as specific of bromine, or "bromism." There is debility, sluggishness, stupor, drowsiness, hebitude. The conjunction becomes insensible, the pupil is dilated, the sense of taste is impaired, and general torpidity of the various functions ensues. Directly "disorders of motility manifest themselves;" the patient "lounges about, his gait becomes altered, and he staggers and rolls like a drunken man." (Bazire.) These symptoms disappear, however, if the medicine be suspended, and some mild stimulant is substituted. Dr. J. Russell Reynolds states, in his usual precise manner, "having seen given K Br. to many hundred of individuals, I have witnessed no ill effects from its administration. I say advisedly *no* ill effects, for in only three cases have there occurred any unpleasant symptoms which could by any possibility be referred to the drug." In one of these three "was some swelling of the nose, and of the submaxillary glands;" in another an "irritable vesicular eruption appeared upon the skin;" these symptoms rapidly disappearing, in both cases, directly the drug was suspended. In a third case there was "the recurrence of syncopal sensations,

which subsided on the addition of twenty drops of chloric ether to each dose of the bromide." (System of Med. Vol. 2, p 281.) But these effects are comparatively rare; are slowly developed, and are exceedingly trivial when compared with the benefit which almost certainly follows the administration of the remedy; and, as already stated, they invariably disappear if the medicine be withheld for a few days.

Secondly: How long may the administration of K Br. in large doses be continued with safety? A partial answer to this question has already been given; a more complete response, however, may be found in the positive statements of the writers already quoted. Dr. Reynolds insists that the remedy may, with entire safety, be given in large doses for any length of time—"for many months, and even for years;" and that "the dose should be gradually increased; and the exhibition of the drug should be most patiently carried on, until all indications for its use shall have ceased. The rash, or acne, on the skin which, is occasionally seen, "is not determined by the quantity of the bromide that is taken;" it sometimes appears after a few doses of five grains each have been taken, "and it has been absent in many cases where thirty grains have been taken three times daily, for periods of six or even twelve months." Bazire, with equal confidence, says: It is remarkable how long moderate doses of the drug can be administered without sensibly affecting the system." "I have seen patients," continues he, "who had taken the bromide for two and three years, in doses of from ten to fifteen grains, two, and sometimes three times a day, with occasional short intermissions only, and whose general health had not, apparently, suffered." It would be perfectly easy to extend these extracts—all strongly corroborative of those already given—to almost any extent, but it scarcely seems necessary.

The conclusion is just and fair that the bromide may,

with safety, be administered in large doses, as high, even, as thirty grains thrice daily, if need be, in the treatment of epilepsy; that it should be persistently given for many weeks and months; that its effects should be carefully watched; that it should be suspended the moment any symptoms of "saturation" or of "bromism" appear; but that it should be immediately resumed in smaller doses, as soon as these symptoms disappear. To this it may be added that the amount demanded in each individual case can, generally, and probably always, be determined, after a few weeks of careful observation. Indeed, it is quite possible that the best effects of bromide in the treatment of epilepsy are only reached when the system is brought under its influence to a point just short of actual "bromism."

What is the real value of bromide of potassium, in the treatment of epilepsy? Does it accomplish a thoroughgoing and permanent cure, or is it merely palliative?

It is very difficult to frame an answer to these queries which shall cover the whole truth. In the present state of our knowledge, and with the comparatively limited experience which physicians have, up to the present time, had in the use of this remedy, it is quite impossible to say precisely how much may be expected from it. But the following propositions are probably not far from the truth:

1st. In a limited number of cases, no good effects can be perceived, even after the remedy has been persistently taken for weeks, or even months.

2d. In a very small proportion of cases, positive cures have resulted; that is, confirmed epileptics have been absolutely free of attacks for a period of time which warrants the conclusion that an absolute cure has been accomplished; and this even, after having discarded the remedy for many months.

3d. In a very large proportion of the cases submitted to systematic and careful treatment with the bromides, great benefit has resulted; in many the attacks are entirely pre-



vented, so long as the medicine is regularly taken; in others the attacks have become very much less frequent, and less persistent, while great improvement in the bodily health, and a more cheerful and hopeful state of mind have likewise resulted; in still others the improvement has been much less, but sufficient to encourage both patient and physician to persevere in the use of the remedy. In fact, an absolute cure, on the one hand, and absolutely no benefit, on the other hand, seem to be the rare exceptions; while in the great mass of cases, the patient receives very marked benefit, in that the attacks are rendered very much less frequent, or altogether suspended during the employment of the medicine; in that the general health usually undergoes a marked improvement; and in that cheerfulness and vivacity take the place of despondency, gentleness and patience supplant irritability and moroseness, and the whole demeanor of the patient becomes changed and improved. These are the results which have been obtained by those who have had the greatest experience in the use of the remedy in question. Bazire says: "It is infinitely superior to all other remedies that have been recommended against epilepsy." Dr. C. Bland Radcliffe is equally emphatic in his testimony, namely: \* \* \* \* "The conclusion at which I have arrived is, that bromide of potassium is the only remedy, in epilepsy, upon which much reliance can be placed." Dr. J. Russell Reynolds, however (who is, *par excellence*, the advocate of large doses), seems to have met with the best results. After alluding to its power as a palliative, he adds, "in some cases, it has completely cured the patient, and the cure has been permanent for years, and *is so now*. Brown-Sequard, Duckworth Williams, Ramskill and Hughlings Jackson are no less earnest in their advocacy of the claims of this remedy. It is useless, however, to summon a cloud of witnesses to sustain a point already beyond dispute.

My own experience in the use of K Br. as a remedy for



epilepsy has been somewhat limited. A long life-time of private practice, even in a populous city, can be expected to furnish comparatively few cases of this most distressing malady; and it is very difficult to retain cases under treatment sufficiently long to accomplish much good by any remedy—much less a remedy which the patient is told, at the outset, he must take for “many months, perhaps for years.” I may be permitted, however, to conclude this paper by the relation of a single case, which must stand as the type of several others which have come under my observation. In doing this, I shall state the facts as briefly as possible, merely premising that it was a case of true and unmitigated epilepsy, of long standing.

CASE.—Peter M., aged twenty, consulted me in Sept., 1867, for epilepsy. Ten years previously, while living in Canada, he drank the contents of the camphor bottle, and ate the undissolved camphor remaining in the bottle. For twenty-four hours afterwards, according to his mother's account, he was comatose, and exceedingly pale, “almost like death.” After this he vomited freely, when the symptoms improved, and he slowly recovered. In less than a month he had a severe attack of epilepsy (this being his first attack), and from this time onward the attacks recurred with increasing frequency, until, when I first saw him, the intervals were never longer than a month. The eyes were dull and listless, the countenance vacant, the memory defective, and the aspect of the patient was that of semi-imbecility. I prescribed ten grains of bromide of potassium three times a day. In the course of the next two months he had two attacks. The dose was then increased to fifteen grains, three times a day. He shortly after had another “fit,” after which they disappeared, and for fifteen months succeeding he suffered not a single attack. Meantime his general appearance improved; the countenance assumed a more intellectual aspect, he became more vivacious; and he even sought, and obtained, employment, giving satisfaction

in the capacity of fireman to a stationary engine. At the end of the time last mentioned, he began to act as "night-watchman," and ceased taking the medicine with regularity. The result was that before a month had passed, he had a recurrence of epilepsy. The bromide was now resumed, and the epileptic attack again ceased. After taking the remedy for several weeks, without any interruption, swelling of the submaxillary glands and soreness of the throat came on; the medicine was suspended for a few days, when these symptoms at once disappeared. But another epileptic seizure was the penalty he paid for the temporary suspension of the remedy. Bromide of ammonium was now substituted for K Br., in doses of fifteen grains three times a day, and he has constantly taken one of these salts in quantities varying from forty-five up to sixty grains a day, up to the present time. No injurious or unpleasant effects, beyond those already mentioned, have, at any time, appeared; on the other hand, the general health has steadily improved, and the patient has, for many months, pursued his employment without interruption.

This case affords an excellent illustration not only of the *good*, but of the ill effects of the bromides in the treatment epilepsy; and of the results which we may reasonably expect in the great majority of instances. But this result, even, is well worth achieving. Any remedy which will, to any extent, mitigate the horrors of this dreadful disease, is, indeed, a boon and a blessing to its unfortunate victims.

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### ***Case of Acute Rheumatism—Pericarditis and Pneumonia.***

BY DR. FRED. B. WOOD.

BIG RAPIDS, MICHIGAN.

EDITORS JOURNAL:

I was called, Feb. 15th, to visit Mrs. T., age 24, American. The patient stated that her health had been good until about

the 10th, when she was attacked with pain and tenderness in the left knee joint, afterwards in the right knee, right ankle and wrist they all being swollen and reddened at my first visit. A part of the time since her attack she had suffered from anorexia, thirst, and severe pain in the præcordia, for which a sinapism had been applied. Aside from this she had received no treatment. I immediately began the alkaline treatment with potash and soda, with small doses of colchicum.

Feb. 24.—On this date there was present a well-marked pericardial friction murmur, with the symptoms of acute pericarditis. The pulse was 124, respirations 60. There was a sharp pain in the præcordia on deep inspiration. In connection with the above treatment four ounces of whisky was directed daily, with sufficient opium to procure relief.

25.—Patient more comfortable. Pulse 120, respirations 54. The affected joints were all painful and tender. The friction murmur was louder than on the previous day. The treatment was continued.

26.—Pulse was 114, respiration 40. Treatment the same.

27.—No change.

28.—Suffered more pain in the præcordia, which was quite tender. Affected joints tender but not painful.

March 1.—There has been no alteration until this date, when she became much worse. The pulse 180; very feeble. She was greatly prostrated, and almost moribund; also complained of great pain in the chest.

The examination being extended revealed the signs of pneumonia in the lower lobe of the left lung. Marked dullness on percussion, and the bronchial respiration existed over this lobe. Impending dissolution denoted. The lips were livid, and the face had a dusky hue. I now withdrew all treatment excepting whisky, opium and ammonia.

2.—One p. m. Pulse 126, respiration 58. Resting well since nine a. m. Has taken half an ounce of whisky, five

grains of carbonate of ammonia, and ten grains of chlorate of potassa every half hour.

3.—Some improvement. On this date I suspended the use of the chlorate of potassa and began giving sul. morphia,  $\frac{1}{8}$  of a grain every hour; other treatment the same.

4.—Pulse 116, respiration 42. Complains of but little pain. Rests well.

5.—Complains of pain more severe. Bronchial breathing continued over lower lobe of left lung.

I now increased the whisky to one ounce each hour. Carbonate of ammonia 15 grains, morphia sul.  $\frac{1}{4}$  grain, also to be given each hour.

6.—Improvement marked. Pulse 112, respirations 38. Complains of no pain; rests well. I ordered beef tea, eggs and milk in moderate quantities. From this date until the eleventh there was but little change, when the respirations had become vesicular over the whole of the affected lobe of the affected lung. Some soreness but no pain in the joints. The friction murmur has almost entirely disappeared.

Pulse 100, respirations 30. I ordered whisky  $\mathfrak{z}$  viij to be taken each day. Eggs 4, milk oj, and beef tea o. ss. each day.

15.—Saw my patient to-day. She considers herself almost well. A well-regulated, full diet ordered. Patient dismissed.

REMARKS.—I have given a condensed account of the history of this case from day to day, after the development of pericarditis and pneumonia, up to the time when the improvement was fairly under way, with reference to the treatment employed.

The treatment was determined by the existence of the affections just named, without regard to the fact that these affections were developed in the course of rheumatism.

How far the measures employed contributed to the favorable issue of the case I leave the reader to judge.

## TRANSLATIONS.

*Regeneration of Nerves.*

BY ALPHONSE LAVAREN AND CH. ROBIN.

[Translated for the Journal from Schmidt's Jahrbucher, Leipsig, Jan., 1869.]

Alphonse Lavaren, by means of experiments upon pigeons and young rabbits (*Recherches experimentales sur la regeneration des nerfs. Téhse de Strasbourg, 1868. 4.*) has arrived at the following conclusions respecting the regeneration of nerves:

1st. Nerves divided or resected at short intervals, can be reunited by a permanent cicatrix of nerve substance.

2d. The nutrition of nerve depends upon the influence of nutritive centers, which are principally emitted with nerve ganglia.

3d. If a nerve be separated from its nutritive center, it becomes atrophied.

4th. The degeneration of a divided nerve is thus determined, in that the nerve tissue undergoes fatty transformation and is absorbed.

5th. The degeneration seizes, simultaneously, the entire peripheral section of a divided nerve.

6th. The reunion of the two segments of a divided nerve is brought about through a tissue, which is rich in young cells.

7th. It seems to follow, that of this tissue, the blood-clot, between the two segments of the nerve, organizes itself.

8th. In the midst of these cells the nerve-fibre originates, in the same manner as the nerve-fibre in the embryo develops itself.

9th. The regeneration can not take place if the two seg-

ments of the divided nerve are widely separated, or if they lie in an old, suppurating wound.

10th. The repair, then, begins in the peripheral nerve-segments, if the connection with the nutritive centers is restored.

11th. The essential element of reparation lies in this: that the nerve-fibre, a secretion from the nuclei of the intervening cell-membrane, becomes again visible.

12th. The reparation seems to proceed from the center to the periphery.

Upon the publication of Lavaren's valuable work, Charles Robin (*Journ. de l'Anat. et de la Phys.* v. 3. p 321. Mai et Juin, 1868) has followed with a brief statement of his own observation of the nerve-reparation above-mentioned. The regeneration begins with the formation of a rich connective tissue, of a reddish, grayish-red, or yellowish-red tint, between the primitive bundles of the two segments, which gradually, in the interstices between, proceeds to where previously the resected nerve lay. In this is found only embryo-plastic substance (the connective-tissue, and young cells of Lavaren and others), together with an amorphous substance and capillaries. At first this tissue is weak, and easily torn, and also rich in vessels. Robin particularly urges the existence of a fine, amorphous, granulated mass between the nuclei and capillaries. The nuclei are partly ovoidal; the ovoidal exist in so much larger numbers, that very speedily the section is filled up by them.

After a couple of days a central connective-tissue of ovoidal nuclei is formed, and appears as fibro-plastic, spindle-form, or stellate cells (plastic cells of other authors). From this the amorphous substance is formed, and of it the entire tissue seems to consist. In this tissue Robin discovered, in dogs and rabbits, from sixteen to twenty-five days after the division of the nerve, for the first time, nerve-fibre, or nerve-tube, which resembled those in the embryo.

The nerve-tubes are formed of elongated, ovoidal nuclei.

A number of nuclei combine in the formation of the single nerve-tube. These nuclei are distinguished from the embryoplastic nuclei, in that they are longer, narrower, paler, and more finely granulated. They lie in the same direction, in ranks one behind another, yet without touching; the narrow interstices between are filled with a pale, finely granulated mass, which is as wide as the nucleus, and so they appear as thin bands, with parallel edges, which seem at first to be actually in contact. These bands are, at first, 0.003 to 0.004 Mm. in width, becoming gradually wider, yet increasing in length, while the nuclei push out toward one another, and, indeed, at first somewhat more rapidly. These bands are 0.005 to 0.007 Mm. in width, about eight to ten weeks after the nerve division has taken place, and resemble Remak's bands; and now they undergo a succession of changes, from which it is evident that they correspond to the nerve-tube. Just as the embryonic development of the peripheral nerves is formed, so also, here, the external membrane of the nerve-tube, and not the axis-cylinder, is the first part of the central nerve-tube which appears. That is to say, the axis-cylinder is not, here, the first part of the nerve-tube which appears.

These bands approach each other simultaneously, and in great numbers. In the middle group of bundles, which is not easily separated from the surrounding connective-tissue, begin the principal changes in the nerve-tubes, and, further off, the same appear in the peripheral bundle; the fine granulation disappears, the bands become paler, and in the center, more transparent, and, upon the sides, appear two parallel pale lines of 0.001 Mm. in thickness.

At this stage of the regeneration the gray or Remak's band is enclosed in nerve-tube. This increases rapidly in size, the nuclei remain enclosed in the membrane, and the granulations lose themselves more and more in the membrane. In consequence of this development the number of nuclei diminish, and they themselves become smaller.



In the canal of the tubular membrane is observed a homogeneous, whitish, strongly refracting fluid, which is recognized as fibre, or myeline. From the ninth week, and often as early even as the sixth week, the myeline may be recognized in the form of globules, or accumulated in isolated spots of the membrane; whereby these acquire a varicose appearance.

An axis-cylinder is first determined in three or four weeks after the section of the nerve.

S. C. B.

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### *Medical Electricity.*

#### *The State of our Knowledge concerning the Application of Electricity to the Treatment of Disease.*

REPORTED TO THE ACADEMY OF SCIENCES, PARIS, BY M.  
BECQUEREL.

#### III.—Results obtained by Different Contemporaries.

After having detailed the electro-physiological phenomena produced by voltaic electricity, which must not be lost sight of in therapeutic applications, we will proceed to speak of results obtained in these applications by the contemporaries, MM. Duchenne (of Boulogne), Namias, Tripier, Poggioli, Scoutetten, Cineselli, Pitet; we have collated the results collected by Remak, long since dead, in order to compare them with those which they have obtained; but in order to utilize them, we will previously revise, in a few words, the facts established hitherto, and of which we have already spoken.

It has been generally recognized by physicians who have preceded those engaged to-day with electro-therapeutics that electrical treatment has for its object to stimulate organs which function imperfectly, and in which life is not

extinct, in order to habituate them gradually to function normally. It seemed to result from their observations that the medical employment of electricity is indicated in the three following cases :

1st.—When it concerns the re-establishment of contractility in muscles which have lost it, when the loss of contractility does not involve, or no longer involves, cerebro-spinal lesions.

2d.—When it refers to the establishment of general sensibility, as well as the special sensibility of the organs of sense, this sensibility being abolished or simply diminished.

3d.—When it is necessary to reduce to the normal condition exaggerated or perverted contractility or sensibility.

Have practical physicians obtained other results with new apparatus? It is doubtful.

M. Duchenne (of Boulogne) uses the method of localized electrization indicated by M. Masson, but which he has perfected, generalized and rendered practical. He operates thus :

He takes dry or moist electrodes, by the aid of which he can, at will, concentrate the electrical action upon the skin, or cause it to traverse this latter in order to confine it to organs situated beneath, either in the nerves, the muscles or the bones, and when the epidermis is very thick, the discharge traverses only the dermis and produces sparks, and a peculiar affection, without occasioning any physiological phenomenon.

If he places upon two points of the skin one of the rheophores moist and the other dry, the part upon which this latter is placed experiences a superficial sensation which is cutaneous. In this case, according to M. Duchenne, the recombination of the two electricities is effected in the dry portions of the epidermis after having traversed the dermis by means of the moist rheophore. By moistening, very slightly, the skin, at the points where the epidermis is very thick, there is produced, in the parts to which the dry rhe-

ophores are applied, a comparatively superficial sensation, stronger than the preceding, without sparks or crepitation.

If the skin and the rheophores are very moist, there are no longer observed either sparks, crepitation, or burning sensations; but there are manifested very variable phenomena of contractility or of sensibility, according as muscle, nerve, or osseous surface may be involved.

Hence he deduces the consequences that by induced currents electrical power in the skin is arrested at will; that without incision or puncture it may be traversed, and the action of the current may be limited to the organs which it covers, that is to say, to muscles, to nerves, and even to bones. M. Ducheune, in the application of his process, has used, successively, the electricity of machines, of the Leyden-jar, of the voltaic pile, and of the induction apparatus, as most resembling muscular electricity, this last being essentially medical, that is to say, it has been able to induce contraction in each of the muscles, singly or of their sheathes.

The following are the results which he obtained :

1st.—He regards as completely demonstrated, the utility of the electrical treatment applied to consecutive paralysis, traumatic lesions of nerves, and to the paralysis from fatty degeneration of infancy. He asserts that at the beginning of these diseases, the degree of the lesion may be recognized by the aid of the electrical contractility and sensibility of the paralyzed muscles.

2d.—Electricity is equally applicable, but with less certainty, to the paralyzes termed spinal, and to those essentially rheumatismal or hysterical, according as they are more or less localized or generalized; but as these affections may be cured spontaneously, or disappear temporarily, the real value of the electrical treatment can not be determined.

3d.—Neuralgias, generally, with the exception of facial neuralgias, are cured by electro-cutaneous excitation.

4th.—Rheumatic muscular pains are rapidly cured by electrical treatment.

5th.—Cutaneous or muscular hyperæsthesia, and cutaneous anæsthesia of hysterical or saturnine origin are advantageously modified by electro-cutaneous excitation.

6th.—He has treated successfully, according to his own statement, local affections, such as paralysis of the seventh, of the third and of the sixth pairs, aphonia, deafness, paralysis of the bladder, and some cases of intestinal strangulation.

7th.—The application of electricity to chorea, to scrivener's palsy, of gout, and of amorosis, has produced results nearly negative. M. Mamias uses, ordinarily, a circular pile of cups formed of two hundred elements charged with salt water. The force of this pile diminishing rapidly, he replaced it by another, and this again by a third, in order to give time to the couples to be depolarized; this was the infancy of these piles. He is positive of having determined that by their use, the calorific or other effects which are inevitable with the cutaneous current piles used to-day, are avoided. The results obtained by him are the following:

1st.—Intermittent currents leave no durable impression upon the living body. Moderate shocks keep the nerves and muscles in exercise, and do not oppose vital reaction. Afflux of blood and increased nutrition follow repeated shocks.

2d.—If the shocks are excessively strong, but yet not sufficient to kill the animal, they leave no disease.

3d.—Continuous currents, too, prolonged produce disease.

4th.—He has recognized the influence of direction upon human nerves, which had been considered null.

5th.—He has determined the cases of paralysis in which the cure is complete, and those in which there is only amelioration, with intermittent currents which are preferable to others; he employs centrifugal currents in paralysis of motion, and centripetal in paralysis of sensation.

6th.—In neuralgias or neurosis there is no fixed rule;

sometimes it is necessary to employ continuous, and sometimes intermittent currents in one sense or another.

7th.—In affections of the vascular and lymphatic system continued currents are necessary, as opposed to affections of the nervous and muscular system, which need intermittent currents.

8th.—He has demonstrated, according to his own account, that the employment of electro-muscular contractility in order to find the seat and the nature of paralysis is an error. M. Poggioli uses exclusively static electricity in the treatment of disease as it was administered before the discovery of the pile, basing his opinions upon the theory of Franklin. He especially recommends electrified water for imbibition, and electric baths.

M. Tripier has presented a *Treatise on Electro-Therapeutics* in which he passes in review all the methods employed, and the results attained, which he seeks to explain by means of theories. He considers as original :

1st.—His reflections upon the action of induction currents according to their direction and intensity;

2d.—The use of excitors of different kinds, especially of charcoal;

3d.—The surgical indications of the galvano-caustic chemical method which he has applied to different pathological conditions;

4th.—The explanation of anæsthesia;

5th.—Experiments upon gustatory sensations induced by mediate or immediate galvanism of the tongue;

6th.—The cure of a certain number of diseases;

7th.—The treatment of hyperplasias of the connective tissues of contractile organs, especially of the uterous and the prostate, etc.

M. Scoutetten presented to the concours a work having for its title *Electricity considered as the principal cause of the action of mineral waters upon the organism*, and in which he treats, from his stand-point :

1st.—Electrical action of mineral waters upon the exterior and the interior of the human body, whether taken in the form of bath or of drink.

2d.—Electricity of the blood of man and of living animals, and of the electrization of transported mineral waters.

In addition to this work M. Scoutetten presented special memoirs in which he has developed the different questions, out of which he has formed a body of doctrine.

M. Ciniselli presented a little treatise in which is set forth a synopsis of his investigations into chemical galvano-cautery, a method pointed out thirty years ago by one of your committee, and which he, also, in connection with M. Breschet, applied at l'Hotel Dieu, of Paris.

Chemical, is distinguished from thermal galvano-cautery in this regard, that the latter cauterizes by means of the heat produced in a metal wire traversed by an electrical current of a certain intensity, whilst the other effects cauterization by the aid of an acid or an alkali, separated from a solution by the chemical action of the current. He employs for this object either a simple circuit, or a circuit in which there is a pile. According to the direction of the current, he directs upon the diseased part an acid or alkaline caustic in the nascent state, and, consequently endowed with great energy. M. Ciniselli enumerates in his treatise the cases in which he effected cures by operating upon tumors of different kinds, in different pathological conditions. M. Nelaton, by the aid of similar methods, has removed nasopharyngean tumors. No one can fail to felicitate M. Ciniselli upon his efforts to apply electro-chemistry to therapeutics; and your committee, likewise, is pledged to persevere in the same direction.

Doctor Pitet has devoted himself to the establishment of a parallel between the physiological and pathological effects produced by interrupted and by continuous currents, and, to demonstrate the superiority of the therapeutic action due to the most feeble over that of the most energetic induced

currents. He has, moreover, arrived at this conclusion: that the best mode of application is that of continuous currents. The results of his investigations are succinctly subjoined :

Induced and continuous currents produce effects essentially different; the first tend to produce constantly a condition inverse to that which exists at the moment of their application; that is to say, their initial specific effect being constantly the same as the pathological condition which they destroy, from which it results that their therapeutic effect is inverse of the first.

Continuous currents, on the contrary, produce upon the affected organ the same effects which they induce in the physiological state, that is to say, a relaxation, a dilatation, etc.

According to his observations, energetic induced currents, applied in the physiological, as well as in the pathological condition, fatigue the subjects, and often aggravate the morbid state; they alter and destroy sensory and motor irritability, whilst continuous currents, on the contrary, are easily tolerated by the organism; they are employed advantageously in vascular congestions; their influence is such, that it should receive serious consideration in therapeutics.

M. Pitet relates a certain number of facts which he considers as demonstrating the principles just indicated.

No one can fail to approve the course of the author in studying, successively, the physiological action of electricity upon an organ in the normal state, and upon the same organ in a morbid condition. This is the true course to be pursued in order to arrive at a correct appreciation of the real therapeutic action of electricity.

M. Remak used piles with constant currents, and piles which have not this property. The results of these experiments are subjoined :

1st.—The continuous current, to a supportable degree, acts upon central organs, and induces, by reflex move-



ments, contractions, even in antagonistic groups of muscles.

2d.—The continuous current increases, within certain limits, the excitability of the nerve, instead of weakening it, and that, too, in the sensitive, as well as in the motor nerves.

3d.—He has affected the resolution of paralytic contractions by means of continuous currents. It is this process which, under favorable circumstances, heals paralysis for the treatment of which intermittent currents are prejudicial.

4th.—He has, likewise, cured old paralysis.

5th.—He has experimented upon patients affected with rheumatic contractions or pains; having transmitted, during about five minutes, a current of fifteen or twenty elements with sulphate of copper, through the muscles of the shoulder, the patient raised his arm, and placed it upon his head.

6th.—He next sought, without success, to discover if the continuous current of a certain force was not of a character to produce some disorder in the organism. The employment of interrupted currents only aided him in particular cases, and which are not even very frequent. If the results just indicated be compared it will be perceived that physicians are not in accord, either in the mode of treatment, or in the results attained.

Indeed, M. Duchenne employs, with success, intermittent currents in the majority of cases, treatment which M. Remak rejects as hurtful, giving the preference to continuous currents. M. Namias pretends to demonstrate that the electric diagnostic of M. Duchenne for the recognition of the seat of paralysis is false. This last does not recognize in man the hypoanæsthetic (?) properties of continuous currents.

M. Remak, and to some extent M. Pitet, asserts that the continuous current increases within certain limits the excitability of the nerve in place of weakening it. It is this

property which has suggested its employment in the treatment of paralysis, in preference to the induced current. It must be added that M. Hifflesheim considered the intermittent current as an excitant and the continuous as a sedative. It should be observed that the hyposthenic action of continuous currents appeared to be very generally recognized, and that physiologists admit that with feeble currents directed successively in inverse manner, there is but very slight hyposthenic action, whilst, when the currents are very intense, this action becomes predominant.

These divergences, as well as others which might be cited, in the results obtained and in the opinions expressed upon the value of this or that proceeding demonstrate the impossibility of deciding, as yet, upon the true therapeutic properties of electricity, whether continuous or intermittent currents are employed, especially when the treatment has not been followed up.

One of two things is certain; either electricity acts effectively, or its action is negative. Upon the first hypothesis it must be concluded that physicians have not experimented under the same conditions of age, of constitution, of vital force, of equal degree of disease, and with electrical appliances having the same intensity; for if every thing had been similar on every hand, there would have been no reasons for not obtaining the same results. Upon the second hypothesis, it would be necessary to admit that nature has done every thing. We are borne to the conclusion, invariably, that the applications have not been made under the same conditions, for it could not be denied that electricity would have acted efficaciously in certain paralyses and other pathological conditions; numerous examples, already old are at hand to sustain it.

#### IV.—Observations and Conclusions.

We ask of the Academy permission to present to it some observations, which will not be without utility for therapeutic applications.

Continuous currents and interrupted currents have each their mode of action; the former, by the aid of moistened electrodes, penetrate under the skin into the organs, and produce there effects physical, chemical, calorific, and, perhaps, of transportation, effects dependant upon the intensity of the current and of the conducting power of the parts which they traverse. These parts are, muscles, nerves, their organic elements, vessels, all tissues, etc., between which, the current divides itself in proportion to the conducting power of parties which do not form a homogeneous entity as a metallic conductor; there are branchings, anastomoses, contacts more or less immediate, from which result resistances, light shocks from changes of conductors, which may be only slight shiverings; special actions upon nerves and upon the muscles, of which we have already spoken; effects of heat produced by obstacles to its passage; perhaps chemical effects upon changes of conductors.

Have all these effects in the course of the electro-physiological investigations upon animals, effects which are interesting to know, been analyzed?

The effects of heat may be studied with great precision by the aid of thermo-electric needles; neither chemical effects nor effects of transportation have, as yet, been determined. Moreover, is it not well known, that threads of metal, a bad conductor, such as platinum, are traversed by intense currents?

Who can say that similar effects are not manifested in nerve-fibres, muscle-fibres, capillary-vessels, etc.

All these effects may exercise an influence upon organic functions; upon this point investigation is necessary. It is necessary, moreover, according to the example of M. Namias, in his electro-physiological experiments upon animals, to observe, after their death, what have been the effects produced upon organs, according as continuous or intermittent currents of given intensity have been employed, in order to make their application to man.

Intermittent currents, independently of the physiological effects already mentioned, produce, likewise, heat, during the successive discharges, as has been demonstrated by discharging a Leyden-jar through a metallic wire, and effects of distension as is seen by passing the charge of a Leyden-jar into a thin tube of glass of small diameter, which flies into fragments; these questions must be examined when it is intended to treat the subject scientifically, whilst investigating the therapeutic effects of electricity; it is thus seen how complex is the action of electricity upon organs.

When the general considerations which precede the memoirs and works presented to the commission are reviewed; it is easy to be convinced that the experimenters formed no just idea of the mode of disengagement of electricity in the apparatus which they used. These apparatusa comprise ordinary electrical machines, voltaic piles with constant currents, electro-magnetic and magneto-electric machines, whose forms and arrangements are very varied. The effects resulting from electricity disengaged during chemical actions is no longer sufficiently considered.

Electricity, whatever may be the source which disengages it, is always of the same nature; it differs from one source to another only by its tension, its quantity, and the duration of its passage. In the pile the tension of the electricity is, in general, weak at the two poles, but it produces energetic physical effects, by reason of the quantity of electricity which passes in the circuit when it is closed.

On the other hand, at the instant of closing the circuit of the pile with a metallic wire, the electric current which traverses this wire produces in it another, by induction, (extra current) proceeding in an inverse manner; this current, whose duration is very short, and may, perhaps, be considered almost instantaneous, tends to diminish, even at the instant of its closure, the intensity of the induction current; upon opening the circuit, there is generated another induced current, directed in the manner of the induction

current, which has the same character as the discharges from the Leyden-jar.

Induced currents generated by voltaic currents, or in wires kept apart, differ amongst themselves in intensity, according to the force of the pile, and the length of the wires. They have a peculiar character, whilst in the discharges there are two instantaneous currents directed in an inverse manner, and acting as alternate currents.

Electro-magnetic or magneto-electric apparatus can be constructed only with the object to facilitate the application of electricity by intermittent currents; the effects which they produce differ between themselves only by the intensity of the discharges; it is even possible to obtain similar effects with Leyden-jars which are discharged and recharged more or less rapidly. There are, therefore, special effects relative to the apparatus determined only by the circumstances of the intensity of the duration and of the succession of the discharges.

In general, sufficient importance is not attached to the physiological effects which may be produced by electricity disengaged by the contact of liquids in organized bodies. When two different liquids, conductors of electricity, are in contact, they place themselves always in two different electrical states, whether there should be a chemical reaction between the two, or only a simple admixture; the one acting as the acid liberating positive, and the other egative electricity. These two electricities remain in the static condition so long as the liquids do not form a closed circuit by means of a solid conducting body not permeable. In the static state, the tension of the electricity is so feeble that very sensitive instruments are necessary for its detection. There is, moreover, a recombination of the two electricities in proportion as they become free, even upon the contiguous surfaces, so long as the chemical action or he mixture continues; it is then impossible to perceive how this electricity could exercise any action upon the internal

organs, especially from the administration of mineral waters. If these waters are alkaline, in reacting upon the acid secretion which covers the skin, they assume negative, and the secretion positive electricity; the recomposition of the two electricities is effected upon the skin, and the internal organs can experience no effect therefrom.

In the second case, when the circuit is closed by means of a metal, electro-chemical effects are, doubtless, produced; but are there, in the organs of men or animals, conductors suitable for forming closed circuits? What are the solid parts, conductors and non-permeable, which could determine the circulation of electricity disengaged by the contact of liquids during their mixture or when they may react chemically upon each other? None such are known; for there are only the tissues which separate the liquids, and by the intermediation of which the reactions are effected; deprived of these liquids they are not conductors.

It is not sufficient to base a physiological theory upon a fundamental fact. It is necessary to begin by demonstrating this fact.

For the present, the existence of electrical currents in the organs of living man, currents due solely to the reaction of liquids, independently of the employment of metallic conductors, is negatively demonstrated.

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## EDITORIAL.

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### *Cancer Curers.*

An esteemed professional friend in Indiana transmits to us the following note, from an inquiring patient, which contains its own moral:

SIR:—My wife is afflicted with a cancer on her left side, pretty well up under the arm. She has been under the treatment of a "cancer quack" at

Chicago for three months, but he has finally given up her case, after receiving a large sum of money from me to warrant a cure. He applied a salve, which eat a great hole in her side; he now refuses to apply the salve to the part affected, on the ground, I believe, that it is too near an artery. I have been advised to write to you, and inquire whether you can do any thing for her.

Please let me know early, as time is precious. Yours Truly, etc.

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### *The Western News Company.*

A few days since was opened in Chicago one of the most extensive and costly-fitted-up Book Stores in the United States. We refer to the Western News Company, 121 and 123 State street, John R. Walsh, Manager. The new quarters of this enterprising company embrace two store fronts. On entering, one is impressed with the richness and beauty of the appointments of this spacious store.

On either side are ranged beautifully carved and adorned book-cases of walnut and chestnut. The style is the pointed or early Gothic, surmounted by pinnacles, the arrangement being so artistic and consummate as to render the whole a series of complete book-cases, of construction and style as elaborate and expensive as any to be found in the private library of the wealthiest book lover. Each set of cases is surmounted by a hooded cornice of walnut, relieved by a groundwork of chestnut, with Gothic mouldings, open quatrefoil tracery above, and a pointed pinnacle surmounting each division. In front of each pilaster is placed a solid walnut column finished with carved capitals. Midway of the store on each side, is placed a gothic niche which forms a perfect division or line of demarkation between the elaborate ornamentation which prevails in the front half, the retail portion of the establishment, and the plainer, though exquisitely beautiful style which finds appropriate place in the wholesale department. These dividing niches stand out in relief past the cases, each being tipped with a pointed gothic hood supported by four walnut columns with carved capitals, and resting upon solid octagon pedestals. The hood is surmounted by carved finial, with open quatrefoil tracery on the ridge.

We have not space to enter into the details of the various departments, but all are arranged in fine taste and convenient for the transaction of business.

In connection with books, rich and rare, from all quarters, an immense trade is done in newspapers and periodicals, with news dealers all over the country.

Mr. John R. Walsh, in fifteen years in Chicago, has risen from obscurity to be the manager of one of the most extensive businesses in the country. We invite all to call and see his beautiful store.



## LOOT.

***Poisoning by Atropia.***

The *Am. Jour. of Pharmacy* reports the result of the trial of Mademoiselle J., at Geneva, Switzerland, for poisoning seven persons with atropia, administered to them as *kirschenswasser*, while they were under her care as nurse. Notwithstanding the plea of insanity, for which the circumstances furnished strong ground, she was sentenced to penal servitude.

***Extirpation of Lachrymal Gland.***

Dr. A. D. Williams, of Cincinnati, has successfully extirpated the lachrymal gland, in a case of imperforate canaliculi, and recommends the operation in such cases, but opposes the recommendation of Lawrence and others to remove the gland in ordinary cases of obstructed nasal duct.—*Cinn-Lancet and Observer*.

***Spurious Vaccination.***

Dr. B. Rormer, of Kanawha Salings, W. Virginia, reports to the same journal a synopsis of four hundred and fifty-seven cases of spurious vaccination; constituting, perhaps, the most comprehensive condensed

***Opium Culture.***

Mr. W. P. Creecy, of Vicksburg, Miss., reports to the same journal the failure of his experiments in the culture of the poppy, but suggests a continuation of the experiments in the South.

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NOTE.—There is no doubt of the practicability of cultivating Opium in some portions of the South, as the writer has tested experimentally in Florida, by using the inspissated juice of the common poppy, which was found to possess similar properties to the opium of commerce. The experiments were, of course, upon a very small scale. Repeated attempts to induce germination in imported seed failed, inducing the belief in the correctness of the commonly received opinion that the capsules were baked before exportation, in order to prevent germination.

W. H.

### *Anatomy.*

The Legislature of the State of Maine has indefinitely postponed the bill for the legalization of the study of anatomy. It is one of the most remarkable inconsistencies of an enlightened (?) age, that society should require the possession of certain knowledge by certain of its members, and withhold, under penalty, the only means whereby such knowledge can be acquired.

The same journal contains a formula for the preparation of carbolic acid plaster, to be used as an antiseptic dressing for wounds. We give it viz.:

Olive oil, 12 parts (by measure).

Litharge, (finely ground) 12 parts (by weight).

Beeswax, 3 parts (by weight).

Crystallized carbolic acid,  $2\frac{1}{2}$  parts (by weight).

Heat half the olive oil over a slow fire, then add the litharge gradually, stirring constantly until the mass becomes thick or a little stiff; then add the other half of the oil, stirring as before, till it becomes again thick. Then add the wax gradually, till the liquid again thickens. Remove from the fire, add the acid, stirring briskly till thoroughly mixed. Cover up close and set aside, to allow the residual litharge to settle; then pour off the fluid and spread upon calico to the proper thickness. If kept in a well-fitting tin cannister it will retain its virtues for any length of time. Another form of antiseptic plaster is the following:

Shellac, 3 parts.

Crystallized Carbolic Acid, 1 part.

Heat the lac, with about one-third of the carbolic acid, over a slow fire, till the lac is completely melted; then remove from the fire and add the remainder of the acid, and stir briskly till the ingredients are thoroughly mixed. Strain through muslin, and when sufficiently cooled spread to the thickness of one-fiftieth of an inch; after, brush over the plaster with a solution of gutta percha in a solution of bisulphide of carbon.

## BOOKS RECEIVED.

**THE STRUCTURAL LESIONS OF THE SKIN: Their Pathology and Treatment.** Illustrated. By HOWARD F. DAMON, A.M., M.D., Fellow of the Massachusetts Medical Society, etc., etc. Philadelphia: J. B. Lippincott & Co., 1869. Pp. 255.

A very acceptable and interesting contribution to the scientific history of this important class of diseases. We cordially commend it to our readers.

**DESCRIPTIVE CATALOGUE OF THE PATHOLOGICAL MUSEUM OF THE PENNSYLVANIA HOSPITAL.** By WILLIAM PEPPER, M.D., Physician to the Philadelphia Hospital, Curator and Pathologist to the Pennsylvania Hospital, etc., etc. Philadelphia: Published by the Board of Managers. For sale by Lindsay & Blakiston, 25 South Sixth Street, Philadelphia. Pp. 138.

**A PRACTICAL TREATISE ON THE DISEASES OF WOMEN.** By T. GAILLARD THOMAS, M.D., Professor of Obstetrics and the Diseases of Women and Children in the College of Physicians and Surgeons, New York, etc., etc., with two hundred and twenty-five Illustrations. Second Edition, Revised and Improved. Philadelphia: Henry C. Lea, 1869. Pp. 647.

The favor in which this book is held by the Profession is evinced by the exhaustion of the first edition (a very large one), within six months from its publication; a well-deserved success.

## PAMPHLETS RECEIVED.

**SUPPLEMENT TO THE REPORT OF THE BOARD OF TRUSTEES OF THE MICHIGAN ASYLUM FOR THE INSANE, for the years 1867-8.**

**THE PART TAKEN BY NATURE AND TIME IN THE CURE OF DISEASES.**

**REPORT ON OBSTETRICS,** read before the State Medical Society, session of 1868, by ABRAM SAGER, M.D.

**THE INTERMARRIAGE OF RELATIONS,** by NATHAN ALLEN, M.D.

**ON THE TREATMENT OF PARALYSIS BY ELECTRIZATION,** with an Explanation of a new galvanic apparatus, by A. D. ROCKWELL, M.D.

**HALF YEARLY COMPENDIUM OF MEDICAL SCIENCE.** Part 3d. January, 1869.